

individual management of brain metastases using special radiotherapy protocols may improve both the patients' survival and quality of life. We aimed at retrospectively studying the effects of low fraction dose whole-brain irradiation (WBRT) accompanied with simultaneous integrated boost (SIB).

**Materials and Methods:** Between 2010 and 2013, 220 patients with brain metastases were irradiated. Conventional WBRT (10 x 3 Gy) was delivered to 67 cases, who had a high number of metastasis. A SIB (15 x 0.7 Gy) dose in addition to WBRT (15 x 2.2 Gy) was applied in 153 cases with an average of 5 (1-14) metastases. We assessed the overall survival (OS) in relation to the recursive partitioning analysis (RPA) value, the Karnofsky index and the metastasectomy (carried out or not) status of the patient.

**Results:** The median OS of the WBRT-only and the WBRT+SIB groups was 3.7 and 6.4 months, respectively. In the WBRT+SIB group, the median OS was better in patients with RPA status 1 versus RPA status 2-3 (16.3 versus 5.3 months,  $p < 0.0001$ ), Karnofsky index  $\geq 70\%$  versus  $< 70\%$  (9.4 versus 4.4 months,  $p < 0.0001$ ), and if metastasectomy was performed (8.0 versus 4.4 months,  $p < 0.024$ ).

**Conclusions:** The differentiated treatment of patients with brain metastases according to the prognostic factors due to the higher cumulative dose of 3D-planned conformal radiotherapy delivered in a reasonable time may increase overall survival and possibly reduces the extent of late neurocognitive damage.

#### EP-1300

SBRT in inoperable oligometastatic disease from breast cancer: a safe and effective approach

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**Purpose/Objective:** There is an increasing evidence that multidisciplinary management of oligometastatic breast cancer with local therapy can improve disease control. The aim of our study is the assessment of safety and efficacy of SBRT in this selected subset of patients.

**Materials and Methods:** Oligometastatic patients from breast cancer were treated with SBRT for 1-3 lung and liver lesions, in an observational study. Prescription dose ranged between 48 and 75 Gy in 3 or 4 consecutive fractions. Primary end-points were local control (LC). Secondary end-point was toxicity, overall survival (OS) and progression-free survival (PFS). Local control was defined according to RECIST and PERCIST criteria. Toxicity was classified according to the Common Toxicity Criteria (CTC) version 3.0.

**Results:** From February 2010 to November 2013, 29 patients were irradiated for a total number of 38 lesions. Twenty-one patients for a total of 27 liver lesions and 8 patients for a total of 11 lung lesions were treated. Median follow-up was 20 (range 4 - 58) months. One and two- three years actuarial LC rate was 100% and 83% respectively. Complete response, partial response, stable disease and progression disease were detected in 24 (63%), 7 (19%), 4 (10%) and 3 (8%) lesions,

respectively. Median overall survival (OS) was 39 months. Actuarial OS rate at 1, 2 and 3 years was 96%, 74 % and 60% respectively. Univariate analysis showed a correlation between OS and DFI  $> 5$  years ( $p < 0.01$ ). Median progression-free survival (PFS) was 14 months, with a PFS rate at 1, 2 and 3 years of 54%, 36% and 31% respectively. No patients experienced radiation-induced liver disease (RILD) or any grade  $> 3$  toxicity.

**Conclusions:** SBRT is a safe and feasible alternative treatment of liver and lung oligometastases from breast cancer, in selected patients not amenable to surgery or other ablative treatments, with acceptable local control and survival rate.

#### EP-1301

Health related quality of life measurements following re-irradiation of metastatic spinal cord compression

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**Purpose/Objective:** Long term follow up after re-irradiation of the spinal cord is lacking. The objective of the present study was therefore to evaluate the feasibility of health related quality of life measurements (HRQOL) measurements using the EQ5D-3L questionnaire following re-irradiation of metastatic spinal cord compression (MSCC). This is the first study to prospectively measure HRQOL in patients re-irradiated for metastatic spinal cord compression

**Materials and Methods:** During 2011 a total of 544 patients with acute symptoms of MSCC were enrolled in a prospective, consecutive cohort study. The Danish version of EQ5D was administered at baseline and 6, 12, 26 and 52 weeks after treatment. Nineteen patients received re-irradiation for progression at a previous irradiated site of the spine. A total of 15 patients answered one or more questionnaires; 7 patients answered the questionnaire between the two treatments of radiotherapy and 8 patients answered the questionnaire after secondary treatment. No questionnaires were available in four patients.

**Results:** Mean age was 63 years (range 43-81) with 3 men and 5 women. Median survival after re-irradiation was 216 days (range 64-553). One patient was still alive at last follow-up. Diagnoses were two colon cancers, three lung cancers, one prostate cancer, one ovarian cancer and one bladder cancer. Median cumulative isoeffective prescribed dose in 2 Gy fractions was 62 Gy (range 47.7-84 Gy;  $\alpha/\beta = 2$ ). Distribution of answers is illustrated in Fig 1. In this strongly selected and small material answers for 'mobility' and 'pain' seems stable but 'usual activities' is declining until time of death. There were no reports of radiation induced myelopathy.

		Week 0	Week 6	Week 12	Week 26	Week 52
Mobility	Level 1	1	1	1	0	0
	Level 2	4	7	5	4	0
	Level 3	1	0	0	0	1
	Missing	2	0	2	4	7
Selfcare	Level 1	4	4	2	1	0
	Level 2	2	4	3	3	1
	Level 3	0	0	1	0	0
	Missing	2	0	2	4	7
Usual activities	Level 1	1	1	1	0	0
	Level 2	2	1	1	1	1
	Level 3	3	6	4	3	0
	Missing	2	0	2	4	7
Pain	Level 1	1	1	1	0	0
	Level 2	3	7	5	2	1
	Level 3	2	0	0	2	0
	Missing	2	0	2	4	7
Depression	Level 1	3	7	6	1	1
	Level 2	3	1	0	3	0
	Level 3	0	0	0	0	0
	Missing	2	0	2	4	7
At risk		8	8	7	5	2
Response rate		0.75	1.00	0.86	0.8	0.5

1 = no problems 2 = some problems 3 = extreme problems

**Conclusions:** Follow up after re-irradiation of the spine with HRQOL was feasible and can provide valuable knowledge about patients after re-irradiation. A prospective study is planned to start in 2015.

Electronic Poster: Clinical track: Treatment preparation and delivery

#### EP-1302

**Implementation and validation of a new fixation system for stereotactic radiotherapy**

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**Purpose/Objective:** Stereotactic radiosurgery (SRS) and radiotherapy (SRT) are established treatment techniques for intracranial malignancies. We evaluated a new intracranial immobilization system with an emphasis on determining the intrafraction motion and the correlation of this motion with treatment time.

**Materials and Methods:** Patients were immobilized using the CIVCO trUpoint ARCH fixation system (CIVCO Medical Solutions). This fixation system is comprised of an individual head cushion, open face thermoplastic mask, bite block and nose fixation, and the arch upon which they are mounted. We collected data from 85 lesions in 73 patients treated between November 2011 and December 2013. 69 out of 73 patients (95%) used the complete mask system, for the others the system had to be adapted. Patients were treated using VMAT stereotactic radiotherapy on a TrueBeam linear accelerator

(Varian Medical Systems, Palo Alto). Fraction doses of 2-8 Gy were applied in 4-30 fractions. Daily cone beam CT (CBCT) imaging was performed before the treatment and was matched to the reference CT using a six degrees of freedom auto-matching procedure. Additionally, post-treatment CBCT were performed to assess intrafraction motion for 67 patients (375 fractions). Van Herk formula was used to calculate CTV to PTV margins.

**Results:** The average 3D set-up error was 2.1 +/- 2.9 mm. The mean pitch and roll was -0.1 +/- 0.7° and 0.2 +/- 0.7°. 98.0 % of the pitch values and 98.9% of the roll values were below 1.5°. Mean intrafractional motion was 0.51mm (+/- 0.27) and mean treatment time was 10.1 min (+/- 1.4). The maximum intrafractional motion was 2.0mm in longitudinal direction and 95% of the total shifts were below 1.4 mm. The linear regression showed a significant influence (p=0.01) of the treatment time on the total intrafractional shift. CTV to PTV margins (including setup error and intra-fractional error) for treatment times of less than 12 min were 0.7 mm and 0.85 mm for treatment times of more than 12 min. The dose absorption of the nose fixation and the bite-block were rather large for a direct field (25% and 28%, respectively) but were correctly modelled in the planning system.

**Conclusions:** Our non-invasive intracranial immobilization system for stereotactic treatments appeared to be robust in terms of setup accuracy, intrafraction motion and repositioning of the patient in the mask system. Daily CBCT and online matching was performed to attain this accuracy and to achieve optimized patient safety.

#### EP-1303

**Effect of mobile insulator sheets for optimization of the deep heating in regional hyperthermia: a prospective study**

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**Purpose/Objective:** One major disadvantage of deep regional hyperthermia (HT) using a radiofrequency capacitive device is the preferential heating of subcutaneous fat tissue, which limits the effectiveness of the capacitive technique. In a phantom study, we previously demonstrated that inserting insulator sheets between the large electrode and body surface and moving them in parallel may optimize the distribution of the deep heating area when using an 8 MHz radiofrequency capacitive heating device. The purpose of this study was to evaluate the effects of the mobile insulator sheets to improve the temperature increase in deep-seated tumors in a prospective clinical study.

**Materials and Methods:** The patient eligibility criteria were as follows: the patients had pelvic tumors which could be treated with definitive radiotherapy (RT) with deep regional HT using an 8 MHz radiofrequency capacitive heating device, and the intra-rectal temperature could be measured. During the definitive RT, a total of five treatment sessions of deep regional HT were planned. Both the upper and lower electrodes were 300 mm in diameter, placed on opposite sides of the whole thoracic region. Conventional heating without mobile insulator sheets was performed during the